**3GPP TSG-SA WG2 Meeting #137E e-meetingS2-2001913**

**Elbonia, 24-27 February 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.273** | **CR** | **0095** | **rev** | **-** | **Current version:** | **16.2.0** |  |
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| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:***  | Clarification on group authorization and location reporting method for bulk operation |
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| ***Source to WG:*** | vivo |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | 5G\_eLCS |  | ***Date:*** | 2020-02-18 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | An accompany discussion paper is S2-2001912.**FIRST CHANGES**In clause 7.2.1, there’s an optional IE "Authorized UE List" for group authorization, the description of this IE is as following:*A list of SUPIs and/or* ***groups of SUPI*** *for which the LCS client may issue a request for a 5GC-MT-LR for immediate or deferred location* But still lack of descrption of how to use it for group id authorization. And only whitelist is not enough.**SECOND CHANGES**For MT-LR procedure with group ID or multiple user IDs, one request will result in multiple response, which break the rule of ONE REQUEST ONE RESPONSE.**THIRD CHANGES**NEF does not perform authorization for MT-LR and LDR procedures, so NEF does not need to perform group mapping for bulk operation.**FOURTH CHANGES**In step 5a and 6, only LDR is allowed to be re-initiated in case of "no AMF ID returned" from UDM, but in step 9, MT-LR also is allowed.**FIFTH CHANGES**In step 5a, GMLC has stored the LCS request and subscribed UE reachability event, but when and whether the stored LCS request needs to be removed and UE reachability event needs to be unsubscribed is not specified. |
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| ***Summary of change:*** | **FIRST CHANGES (6.8 and 7.2.1)**Add description for group authorization in step 3 of 6.8.Add "Denied UE list" IE in LCS Client profile in clause 7.2.1 for goup authorization.**SECOND CHANGES (6.8 and 6.1.2)**Specify difference for MT-LR in bulk operation that 24b-1 is notification not response in step 5b of 6.8.Change step 2 of 6.8 for not only LDR, but also MT-LR, so all UE’s location information can be provided via notification.For MT-LR in bulk operation, if error happend, use notification to notify AF in step 5a of 6.8.Specify difference for MT-LR in case of multiple user IDs in step 1 of 6.1.2. **THIRD CHANGES (6.8)**Remove NEF from step 1.**FOURTH CHANGES (6.8)**Remove "it is a deferred location request and" from step 5a, and "For the deferred location request, " from step 6.**FIFTH CHANGES (6.8)**Specify that GMLC remove the stored LCS request and unsubscribe the UE reachability event after stored LCS request has been performed at step 9. |
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| ***Consequences if not approved:*** | 1. How to perform group authorization is not defined. 2. Rule of ONE REQUEST ONE RESPONSE will be violated if using LCS request with group ID or multiple user IDs. 3. MT-LR cannot be re-initiated if UE in a group does not registered in 5G. 4. No specification of when and whether stored LCS request needs to be removed and UE reachability event needs to be unsubscribed. |
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| ***Clauses affected:*** | 6.8, 7.2.1, 6.1.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\*\*\* FIRST CHANGES \*\*\*

6.8 Bulk Operation of LCS Service Request Targeting to Multiple UEs

The procedure described in this clause applies to 5GC\_MT\_LR and Deferred 5GC-MT-LR request targeting to a group of UE identified by an internal group ID, if available.

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**Figure 6.8.1: Bulk operation of LCS service request targeting to multiple UEs**

1. This step is the same as step 1 of clause 6.1.2 and step 1 of clause 6.3, with the difference that the LCS request is targeting a group of UE identified by a group ID. The GMLC may map the external group ID to the list of UE ID (i.e. SUPI) using Nudm\_SDM\_Get (Group Identifier Translation, External Group Identifier) service operation.

2. The GMLC responds to the LCS Client / AF with an acknowledgment.

 GMLC may decide whether completely or partially (i.e. accept part of the UE(s) within the group identified by the group ID in step 1) reject the location request. If GLMC decides to partially reject the location request, GMLC will respond to the LCS client /AF with a proper error cause.

Steps 3 to 5 are carried out once per UE.

3. The GMLC invokes a Nudm\_SDM\_Get (LCS privacy, SUPI) service operation towards the UDM to get the privacy settings of the target UE. The GMLC checks the privacy settings considering the group ID, i.e. verifies whether the LCS Client / AF is allowed to use the group ID with the information in clause 7.2.1 before privacy check. For the UE whose privacy setting does not allow it to be located, steps 4 and 5 are skipped. The GMLC may also subscribe to and receive notification of UE privacy profile updates according to steps 0 and 4 of clause 6.12.1.

4. The GMLC invokes a Nudm\_UECM\_Get service operation towards the UDM of the target UE with SUPI of this UE. The UDM returns the current serving AMF ID to the GMLC.

5a. If no AMF ID is returned at step 4:

- if the GMLC supports the storage of the LCS service request for a group of UE, the GMLC subscribes the UE reachability status to the UDM using Nudm\_EventExposure\_Subscribe service operation with the data key "SUPI";

- otherwise, the GMLC returns an appropriate error message to the LCS client or notifies an appropriate error cause to the AF.

5b. If the UDM returns the current serving AMF ID to the GMLC at step 4:

- the GMLC initiates 5GC\_MT\_LR procedure (from step 4 onwards) as described in clause 6.1.3 with the difference that step 24b-1 is Ngmlc\_Location\_EventNotify service operation (step 1b-2 is a implicit event subscription from the GMLC);

- or the GMLC initiates Deferred 5GC-MT-LR Procedure (from step 4 onwards) as described in clause 6.3 with the difference that Step 8 is skipped.

6. If any UE in the group didn't get its serving AMF ID at step 4, the GMLC may store the LCS service request locally if the GMLC supports the storage of the LCS service request for a group of UE; otherwise, this step is skipped.

Further steps apply to the UEs of the group who was not registered to the network when the LCS service request is received at GMLC.

7. UE performs the registration as described in clause 4.2.2 of TS 23.502, during which an AMF is selected to serve the UE, and the AMF ID is stored into UDM.

8. UDM notifies the GMLC who had subscribed the UE registration at step 5a using Nudm\_EventExposure\_Notify service operation, which includes "SUPI" and UE registration status.

9. GMLC initiates 5GC\_MT\_LR procedure (from step 2 onwards) or Deferred 5GC-MT-LR Procedure (from step 2 onwards) as described in clause 6.1.3 or clause 6.3. After stored LCS request has been performed for the UE, the GMLC unsubscribes the UE reachability status to the UDM and removes the stored LCS request for the UE.

\*\*\* SECOND CHANGES \*\*\*

7.2.1 Information for an LCS Client

The GMLC holds information for external LCS clients which are permitted to request location information for UE subscribers. Table 7.2.1-1 shows the information which may be stored in the GMLC for an external LCS Client.

**Table 7.2.1-1: GMLC Information for an External LCS Client**

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| --- | --- | --- |
| LCS Client Information | Status | Description |
| LCS Client Type | M | Identifies the type of LCS client from among the following:- Emergency Services- Value Added Services- PLMN Operator Services- Lawful Intercept Services |
| External identity | O | A list of one or more identifiers used to identify an external LCS client. The identity may be used for a 5GC-MT-LR and/or 5GC-MO-LR. The format of the identity is an international E.164 address, ITU-T Recommendation E.164 [23]. |
| Authentication data | M | Data employed to authenticate the identity of an external LCS client – details are outside the scope of the present document |
| Internal identity | O | Identifies the sub-type of a PLMN operator services LCS Client from among the following:- LCS client broadcasting location related information- O&M LCS client in the HPLMN- O&M LCS client in the VPLMN- LCS client recording anonymous location information- LCS Client supporting a bearer service, teleservice or supplementary service to the target UE |
| Client name | O | An address string which is associated with the LCS client's external identity (i.e., E.164 address). |
| Client name type | O | Indication of the type of the LCS client name. The type of the LCS client name can be one of the following:- Logical name- MSISDN- E-mail address (RFC 2396 [25])- URL (RFC 2396 [25])- SIP URL (RFC 3261 [26])- IMS public identity (1 23.228 [27]) - GPSI  |
| Override capability | O | Indication of whether the LCS client possesses the POI capability (only applicable to lawful intercept and emergency services clients) |
| Authorized UE List | O | A list of SUPIs and/or groups of SUPI for which the LCS client may issue a request for a 5GC-MT-LR for immediate or deferred location.  |
| Denied UE List | O | A list of SUPIs and/or groups of SUPI for which the LCS client shall not issue a request for a 5GC-MT-LR for immediate or deferred location.  |
| Priority | O | The priority of the LCS client |
| QoS parameters | M | The default QoS requirements for the LCS client, comprising:- Accuracy- Response time- LCS QoS Class |
| Service Coverage | O | A list of E.164 country codes for geographic areas, ITU-T Recommendation E.164 [23] where the LCS client is permitted to request and receive UE location information. |
| Allowed LCS Request Types | M | Indicates which of the following are allowed:- Request of current immediate location- Request of current or last known immediate location- Request of deferred location for the UE available event- Request of deferred location for UE periodic events- Request of deferred location for the Area Event- Request of deferred location for the Motion Event |
| Local Co-ordinate System | O | Definition of the co-ordinate system(s) in which a location estimate shall be provided – details are outside the scope of the present document |
| Access Barring List(s) | O | List(s) of SUPIs or groups of SUPI for which a location request is barred |
| Service Identities | O | List of service identities allowed for the LCS client. |
| Maximum Target UE Number | O | The maximum number of the Target UEs in one LCS request. For a specific LCS Client, this parameter may have different values for different service identities. |

\*\*\* THIRD CHANGES \*\*\*

6.1.2 5GC-MT-LR Procedure for the commercial location service

Figure 6.1.2-1 illustrates the general network positioning requested by the LCS clients or the AF external to the PLMN. In this scenario, it is assumed that the target UE may be identified using an SUPI or GPSI. This procedure is applicable to a request from an external LCS client or AF for a current location of the target UE, and it is assumed that

- Privacy verification may be required for the location service request;

- The LCS client or the AF needs to be authorised to use the location service.

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**Figure 6.1.2-1: 5GC-MT-LR Procedure for the commercial location services**

1. The external location services client or the AF (via NEF) sends a request to the (H)GMLC for a location and optionally a velocity for the target UE which may be identified by an GPSI or an SUPI. The request may include the required QoS, supported GAD shapes, LCS client type and other attributes. (H)GMLC (for 1a) or NEF (for 1b) authorizes the External Client or the AF for the usage of the LCS service. If the authorization fails, step 2-23 are skipped and (H)GMLC (for 1a) or NEF (for 1b) responds to the external Client or the AF the failure of the service authorization in step 24. In some cases, the (H)GMLC derives the GPSI or SUPI of the target UE and possibly the QoS from either subscription data or other data supplied by the LCS client or AF.

 The LCS request may carry also the Service Identity and the Codeword and the service coverage information. The (H)GMLC may verify that the Service Identity received in the LCS request matches one of the service identities allowed for the LCS client or AF. If the service identity does not match one of the service identities for the LCS client or AF, the (H)GMLC shall reject the LCS request. Otherwise, the (H)GMLC can map the received service identity in a corresponding service type.

 If the LCS service request contains the pseudonym of the target UE and the (H)GMLC cannot resolve the PMD address from the pseudonym, the (H)GMLC itself determines the verinym (GPSI or SUPI) of the target UE. If the (H)GMLC can resolve the address of PMD from the pseudonym, the HGMLC requests the verinym from its associated PMD. If (H)GMLC is not able to obtain the verinym of the target UE, the (H)GMLC shall cancel the location request.

 If the requested type of location is "current or last known location" and the requested maximum age of location information is available, the (H)GMLC verifies whether it stores the previously obtained location estimate of the target UE. If the HGMLC stores the location estimate and the location estimate satisfies the requested accuracy and the requested maximum age of location, the (H)GMLC checks the result of the privacy check at step 2. In case the result of the privacy check for call/session unrelated class is "Location allowed without notification" then steps 3-22 may be skipped.

 If location is required for more than one UE, the steps following below may be repeated.

1b-1 AF sends the LCS service request to the NEF.

1b-2 The NEF identifies based on the QoS attribute received from the location request that higher than cell-ID level location accuracy is required and invokes the Nglmc\_ProvideLoacation\_Request service operation to the (H)GMLC, which contains the attributes received from the AF request. The NEF may also invoke the Nglmc\_ProvideLocation\_Request service operation to the (H)GMLC for lower than cell-ID location accuracy as an implementation option.

 If location is required for more than one UE, the steps following below may be repeated with the difference that the HGMLC responses to the Ngmlc\_Location\_ProvideLocation request immediately and step 24b-1 is Ngmlc\_Location\_EventNotify service operation (step 1b-2 is a implicit event subscription from the GMLC), and in that case the NEF or HGMLC receiving location request, shall verify whether the number of Target UEs in the LCS request is equal to or less than the Maximum Target UE Number of the LCS client. If Maximum Target UE Number is exceeded, the NEF or HGMLC shall reject the LCS request, the step 2-14 are skipped, and then GMLC respond to the client with proper error cause in the step 15.

NOTE 1: If cell-ID level or lower than cell-ID level location accuracy is required in the location request, the NEF may invoke an Namf\_EventExposure\_Subscribe service operation to subscribe location event reporting from the AMF for the target UE as further described in clause 6.5.

2. The (H)GMLC invokes a Nudm\_SDM\_Get service operation towards the UDM of the target UE to get the privacy settings of the UE identified by its GPSI or SUPI. The UDM returns the target UE Privacy setting and the SUPI of the UE. The (H)GMLC checks the privacy settings. If the target UE is not allowed to be located, steps 3-22 are skipped.

3. The (H)GMLC invokes a Nudm\_UECM\_Get service operation towards the UDM of the target UE with SUPI of this UE. The UDM returns the network addresses of the current serving AMF and additionally the address of a VGMLC (for roaming case). If the location request is an immediate location request, the (H)GMLC checks the country codes of the serving node addresses. If the (H)GMLC finds the current AMF is out of the service coverage of the (H)GMLC, the (H)GMLC returns an appropriate error message to the LCS client or AF.

NOTE 2: The UDM is aware of the serving AMF address at UE registration on an AMF as defined in clause 4.2.2.2.2 of TS 23.502 [19]. The UDM is aware of a serving VGMLC address at UE registration on an AMF as defined in clause 4.2.2.2.2 of TS 23.502 [19].

NOTE 3: The HGMLC can also query the HSS of the target UE for a serving MME address as described in clause 9.1.1 of TS 23.271 [4]. The EPC-MT-LR procedure described in clause 9.1.15 of TS 23.271 [4], excluding the UE availability event, may then be performed instead of steps 4-23, e.g. if the HSS returns an MME address but the UDM does not return an AMF address.

4. For a non-roaming case, this step is skipped. In the case of roaming, the HGMLC may receive an address of a VGMLC (together with the network address of the current serving AMF) from the UDM in step 3, otherwise, the HGMLC may use the NRF service in the HPLMN to select an available VGMLC in the VPLMN, based on the VPLMN identification contained in the AMF address received in step 3. The HGMLC then sends the location request to the VGMLC by invoking the Ngmlc\_ProvideLocation service operation towards the VGMLC. In the cases when the HGMLC did not receive the address of the VGMLC, or when the VGMLC address is the same as the HGMLC address, or when both PLMN operators agree, the HGMLC sends the location service request message to the serving AMF . In this case, step 4 is skipped. If the result of privacy check indicates that the notification (and verification) based on current location is needed, the HGMLC shall send a location request to the VGMLC indicating "positioning allowed without notification" and VGMLC shall invoke an Namf\_Location\_ProvidePositioningInfo Request service operation towards the AMF at step 5.

5. In the case of roaming, the VGMLC first authenticates that the location request is allowed from this HGMLC, PLMN or from this country. If not, an error response is returned. The (H)GMLC or VGMLC invokes the Namf\_Location\_ProvidePositioningInfo service operation towards the AMF to request the current location of the UE. The service operation includes the SUPI, the client type and may include the required LCS QoS, supported GAD shapes and other attributes as received or determined in step 1.

NOTE 4: The location request forwarded at step 4 and step 5 may also carry the result of the privacy check in step 2 which may include a codeword provided by the LCS Client or AF and an indication of a privacy related action as described in clause 5.4.

6. If the UE is in CM IDLE state, the AMF initiates a network triggered Service Request procedure as defined in clause 4.2.3.4 of TS 23.502 [19] to establish a signalling connection with the UE.

 If signalling connection establishment fails, step 7-13 are skipped and the AMF answers to the GMLC in step 14 with the last known location of the UE (i.e. Cell ID) together with the age of this location.

7. If the indicator of privacy check related action indicates that the UE must either be notified or notified with privacy verification and if the UE supports LCS notification (according to the UE capability information), a notification invoke message is sent to the target UE, indicating the identity of the LCS client the Requestor Identity (if that is both supported and available) and whether privacy verification is required.

8. The target UE notifies the UE user of the location request and, if privacy verification was requested, waits for the user to grant or withhold permission. The UE then returns a notification result to the AMF indicating, if privacy verification was requested, whether permission is granted or denied for the current LCS request. If the UE user does not respond after a predetermined time period, the AMF shall infer a "no response" condition. The AMF shall return an error response to the (H)GMLC if privacy verification was requested and either the UE user denies permission or there is no response with the UE privacy profile received from the (H)GMLC indicating barring of the location request.

 The notification result also indicates the Location Privacy Indication setting for subsequent LCS requests; i.e whether subsequent LCS requests, if generated, will be allowed or disallowed by the UE. The Location Privacy Indication may also indicate a time for disallowing the subsequent LCS requests.

9. The AMF invokes the Nudm\_ParameterProvision\_Update (LCS privacy) service operation to store in the UDM the Location Privacy Indication information received from the UE. The UDM may then store the UE privacy setting information into the UDR as the "LCS privacy" Data Subset of the Subscription Data.

10-13. Step 10-13 are the same as steps 6-9 defined in clause 6.1.1.

14. The AMF returns the Namf\_Location\_ProvidePositioningInfo Response towards the (V)GMLC (or HGMLC for roaming when the NL3 reference point is not supported) to return the current location of the UE. The service operation includes the location estimate, its age and accuracy and may include information about the positioning method.

15. In case of roaming, the VGMLC forwards the location estimation of the target UE, its age, its accuracy and optionally the information about the positioning method received at step 14 to the HGMLC. For non-roaming scenario, this step is skipped.

16. If the privacy check in step 2 indicates that further privacy checks are needed, the (H)GMLC shall perform an additional privacy check in order to decide whether the (H)GMLC can forward the location information to the LCS client or AF or send a notification if the result of the privacy check requires the notification and verification based on current location. One example when this additional privacy check is needed is when the target UE user has defined different privacy settings for different geographical locations. When an additional privacy check is not needed, the (H)GMLC skips steps 17-23.

17. If the result of privacy checks in step 16 indicates that the notification (and verification) based on current location is needed, and in the case of roaming, the (H)GMLC shall send a location request to the VGMLC indicating "notification only",

18. The (H)GMLC or VGMLC invokes the Namf\_Location\_ProvidePositioningInfo service operation towards the AMF to request notification (and verification) based on current location.

19. If the UE is in CM IDLE state, the AMF initiates a network triggered Service Request procedure as defined in clause 4.2.3.4 of TS 23.502 [19] to establish a signalling connection with the UE.

20. If the UE supports LCS notification, the AMF sends a notification invoke message to the target UE, indicating the identity of the LCS client the Requestor Identity (if that is both supported and available) and whether privacy verification is required.

21. Step 21 is the same as step 8.

22. The AMF returns the Namf\_Location\_ProvidePositioningInfo Response towards the (V)GMLC (or HGMLC for roaming when the NL3 reference point is not supported) with an indication of the result of notification and verification procedure performed in steps 20-21.

23. In case of roaming, the VGMLC forwards an indication of the result of notification and verification procedure to the HGMLC. For non-roaming scenario, this step is skipped.

24. The (H)GMLC sends the location service response to the external location services client or AF (via the NEF). If the location request from the LCS client or AF contained the pseudonym and the (H)GMLC resolved the verinym from the pseudonym in step 1, the (H)GMLC shall use the pseudonym of the target UE in the location response to the LCS client or AF. If the LCS client or AF requires it, the (H)GMLC may first transform the universal location co-ordinates provided by the AMF into some local geographic system. The (H)GMLC may record charging information both for the external LCS client or AF and inter-network revenue charges from the AMF's network. The location service response from the (H)GMLC to the external LCS client or AF may contain the information about the positioning method used and the indication whether the obtained location estimate satisfies the requested accuracy or not. If in step 2, step 16 or step 23 the (H)GMLC identifies that the target UE is not allowed to be located by the external LCS client or AF, it rejects the LCS service request, and optionally indicate in the response the reason of the rejection, i.e. the target UE is not allowed to be located.

\*\*\* END OF CHANGES \*\*\*